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U.S. Surplus Property Administration

Synthetic-rubber plants and facilities

[Washington]

[1946]

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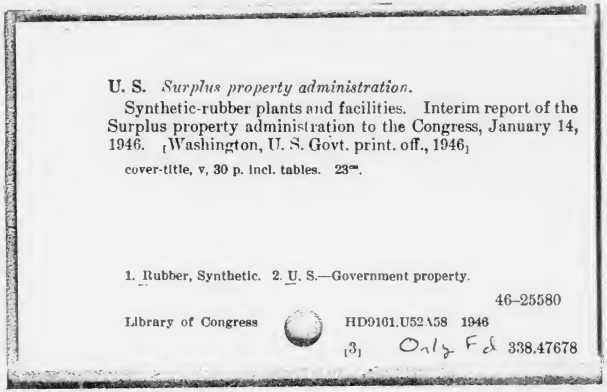

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Synthetic-Rubber Plants and Facilities

INTERIM REPORT OF THE

SURPLUS PROPERTY ADMINISTRATION

TO THE CONGRESS

January 14, 1946

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LETTER OF SUBMITTAL

SURPLUS PROPERTY ADMINISTRATION,
Washington, D. C., January 14, 1946.

The Honorable The PRESIDENT OF THE SENATE.
The Honorable The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIRS:

In accordance with section 19 of the Surplus Property Act of 1944, we submit herewith an interim report with respect to Government-owned synthetic-rubber plants and facilities.

Respectfully,

THE SURPLUS PROPERTY ADMINISTRATION,

W. Stuart Symington

W. STUART SYMINGTON,
Administrator.

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INTRODUCTION

Section 19 of the Surplus Property Act of 1944 requires the Surplus Property Administration to report to the Congress on surplus Government-owned synthetic-rubber plants and facilities with individual costs of not less than $5 million, describing the nature and amount of the properties, outlining the economic problems which may affect the disposal of the plants, and presenting a disposal program for surplus plants.

This is an interim report including a description of the properties and a statement concerning their present status. A complete report could not be prepared at this time since none of the synthetic-rubber plants has been declared surplus and certain factors explained below make their surplus declaration indefinite.

The situation which makes the statement of a disposal program impossible at the present time is as follows:

1. In view of the great complexity of determining the status of synthetic-rubber production in relation to natural rubber, with due regard to considerations of national defense, an Inter-Agency Policy Committee on Rubber, on which the Surplus Property Administration is represented, was established by the Office of War Mobilization and Reconversion. This committee will in the early future report its findings and recommendations to the President and the Congress.

2. Pending the review of facts and determination of policy which should follow the report of the Inter-Agency Policy Committee on Rubber, the Reconstruction Finance Corporation, the owning agency, has not declared any plants surplus and has stated its intention of not doing so until the situation is further clarified.

3. In view of the absence of plants currently surplus and the uncertainty to what extent or at what date they will be declared surplus, the Administration finds itself in the position of being unable to formulate a program of current applicability for the disposal of surplus plants. It has, however, given the matter close and continuing attention, and will be able to present the Congress with such a program promptly, as and when plants are placed in the surplus status.

For purposes of the present interim report there follows a description of the Government-owned plants and facilities and a statement of the principal problems connected with adjusting their use to postwar circumstances.

Part I

THE SYNTHETIC-RUBBER INDUSTRY AND THE GOVERNMENT'S INVESTMENT

Development of the Synthetic-Rubber Program

Rubber constitutes one of the most vital raw materials of American industry. Before the war, the United States relied for its supply almost entirely on imports of natural rubber—supplemented by reclaimed rubber. These imports had nearly all to be derived from southeastern Asia, since relatively little rubber was grown elsewhere. By 1940, this dependence on imports, which might before long be cut off by war, became so alarming that, in addition to entering upon the stockpiling of natural rubber, plans were initiated for the establishment of a domestic synthetic-rubber industry. The outcome was the authorization, in May 1941, of a program for the construction of Government synthetic plants capable of producing 40,000 long tons of synthetic rubber annually. Pearl Harbor made a rapid increase in the authorized program imperative, and, within a few months, it was raised to 805,000 tons, a 20-fold expansion. Subsequent additions to the synthetic-plant program were relatively small and, at the end of the war, completed capacity stood at 833,000 tons.

This figure represents rated capacity as based on engineers' original estimates. Experience indicates, however, that the output of the plants can on the average be expanded to around a third above rated capacity. The Government's synthetic-rubber plants are, therefore, capable of producing about 1,100,000 tons of rubber a year, though pushing productive capacity involves some deterioration of quality. This capacity will undoubtedly considerably exceed the country's peacetime needs for synthetic rubber.

Types of Synthetic Rubber Produced

The synthetic rubber produced under the Government program is of three types—GR–S (butadiene-styrene), GR–I (butyl), and GR–M (neoprene)—for which plant capacities are respectively 705,000, 68,000, and 60,000 tons.

GR–S (butadiene-styrene), the dominant factor in the Government program, is a general purpose rubber used mainly for the production of tires. The principal materials required for its manufacture are two chemical compounds, butadiene and styrene, about

three parts butadiene by weight to one of styrene being used. Butadiene, in turn, can be produced either from petroleum hydrocarbons or industrial alcohol, while styrene is made by the combination of ethylene and benzene.

The combination of butadiene and styrene in GR–S is effected by a process known as copolymerization, performed in copolymer plants.

GR–I (*butyl type*) has certain qualities, notably impermeability to air, which make it more suitable than other known rubber substitutes for the manufacture of inner tubes, gas bags, barrage balloons, and other pneumatic-rubber products. Butyl is manufactured from isobutylene and isoprene, two petroleum products which are not required in the manufacture of butadiene or styrene.

GR–M (*neoprene*) was developed by the Du Pont Company, which produced a small amount for commercial use for some years before the war. High resistance to oil and chemicals makes it particularly valuable for special purposes where this quality is desired. The main material required for its manufacture is acetylene gas—generated from calcium carbide, but nitrogen is also an important item in its production.

The synthetic-rubber program had, of course, to assure a sufficient supply of the materials needed for the manufacture of the finished product. In addition to the construction of GR–S, GR–I, and GR–M plants, the Government had, therefore, to procure large new facilities for the production of butadiene, styrene, and other chemicals.

Government Investment in Synthetic-Rubber Facilities

The Government's investment in the entire plant expansion program—inclusive of $36 million embodied in scrambled facilities—totals about $716 million. The distribution of the investment among the various kinds of plants is shown in table 1 below:

Table 1

Government investment in synthetic-rubber facilities [1]

Kind of Plant	Government-owned Plants		Scrambled Facilities	
	No.	Amount [2] ($000)	No.	Amount [2] ($000)
GR–S	13	$157,706		
GR–I	2	51,819		
GR–M	1	38,415		
Petroleum—Butadiene	10	215,171	5	$21,664
Alcohol—Butadiene	3	115,438		
Styrene	5	77,277		
Chemical [3]	10	24,584	11	14,283
TOTAL	44	$680,410	16	$35,947

[1] From information furnished by Office of Defense Plants and Office of Rubber Reserve.
[2] All amounts as of August 31, 1945, disbursements less sales, transfers, etc.
[3] Includes carbon black plants.

Practically the entire synthetic-rubber industry is Government owned. As table 2 reveals, privately owned synthetic-rubber plants have a capacity of only 32,550 tons a year. This includes no butyl-type rubber (GR–I), and only a negligible amount (1,800 tons) of GR–S. Private neoprene capacity—all owned by Du Pont—is equivalent to one-sixth of the Government-owned neoprene capacity. Two-thirds of the synthetic-rubber capacity owned by private industry is devoted to the production of a type of synthetic rubber not made in the Government plants. This is GR–A, a special purpose rubber made by the copolymerization of styrene and acrylonitrile. Like neoprene, it is resistant to oil and chemicals. It will be seen from the table that private industry also owns relatively small amounts of butadiene and styrene capacity.

Table 2

Rated capacities of Government-owned and privately owned synthetic-rubber facilities

Kind of Plant	Government-owned	Privately Owned [1]
	Long Tons/Yr.	*Long Tons/Yr.*
GR–S	705,000	1,800
GR–I	68,000	
GR–M	60,000	9,750
GR–A		21,000
	833,000	32,550
	Short Tons/Yr.	*Short Tons/Yr.*
Butadiene—		
Petroleum	413,000	50,500
Alcohol	220,000	
Styrene	187,500	18,000

[1] Rubber Reserve Company: Report on the Rubber Program 1940–1945, p. 68. This source gives the names of the individual owning companies, and the location and capacity of the separate plants.

The Surplus Property Act requires the Administration to submit disposal plans to the Congress for plants which cost the Government $5 million or more. All the synthetic-rubber, butadine, and styrene plants fall in this category, but eight of the ten chemical plants embraced in the program cost lesser amounts. The plants costing not less than $5 million are listed in the accompanying table 3. Detailed descriptions of the individual plants were prepared by the Office of Rubber Reserve and are given in the appendix.

Table 3

Government investment in synthetic-rubber plants and facilities costing more than $5 million

Plant and Operator		Investment	Rated Capacity
			[1] Long Tons/Yr.
ALL PLANTS		$670, 357, 000	
GR-A Plants—Neoprene Rubber—			
Louisville, Ky.—E. I. du Pont de Nemours & Co		38, 415, 000	60, 000
GR-I Plants—Butyl Rubber—	TOTAL	51, 819, 000	68, 000
Baton Rouge, La.—Standard Oil Co. of N. J		25, 882, 000	38, 000
Baytown, Tex.—Humble Oil & Refining Co		25, 937, 000	30, 000
GR-S Plants—Butadiene—Styrene Rubber—	TOTAL	157, 706, 000	705, 000
Baton Rouge, La.—Copolymer Corp		7, 332, 000	30, 000
Akron, Ohio—Firestone Tire & Rubber Co		7, 706, 000	30, 000
Lake Charles, La.—Firestone Tire & Rubber Co		13, 061, 000	60, 000
Port Neches, Tex.—Firestone Tire & Rubber Co.[1]		16, 046, 000	60, 000
Port Neches, Tex.—B. F. Goodrich Co.[1]		16, 047, 000	60, 000
Borger, Tex.—B. F. Goodrich Co		8, 842, 000	45, 000
Louisville, Ky.—B. F. Goodrich Co		11, 120, 000	60, 000
Baytown, Tex.—General Tire Co		7, 829, 000	30, 000
Akron, Ohio—Goodyear Synthetic Rubber Corp		7, 548, 000	30, 000
Houston, Tex.—Goodyear Synthetic Rubber Corp		13, 415, 000	60, 000
Los Angeles, Calif.—Goodyear Synthetic Rubber Corp.[1]		10, 000, 000	60, 000
Los Angeles, Calif.—U. S. Rubber Co		5, 080, 000	30, 000
Naugatuck, Conn.—U. S. Rubber Co		8, 357, 000	30, 000
Institute, W. Va.—U. S. Rubber Co		18, 398, 000	90, 000
Louisville, Ky.—National Synthetic Rubber Corp		6, 865, 000	30, 000
			Short Tons/Yr.
Butadiene—from Alcohol—	TOTAL	115, 438, 000	220, 000
Institute, W. Va.—Carbide & Carbon Chemical Corp		38, 486, 000	80, 000
Louisville, Ky.—Carbide & Carbon Chemical Corp		34, 952, 000	60, 000
Kolouta, Pa.—Koppers, Inc		42, 000, 000	80, 000
Butadiene—from Petroleum—	TOTAL	215, 171, 000	413, 000
Lake Charles, La.—Cities Service Co		17, 029, 000	55, 000
Baytown, Tex.—Humble Oil & Refining Co		18, 790, 000	30, 000
Port Neches, Tex.—Neches Butane Products Co		56, 693, 000	100, 000
Los Angeles, Calif.—Shell Union Oil Corp		19, 917, 000	55, 000
Houston, Tex.—Sinclair Rubber, Inc		30, 889, 000	50, 000
Baton Rouge, La.—Standard Oil Co. of N. J		8, 762, 000	15, 000
Borger, Tex.—Phillips Petroleum Co		35, 682, 000	45, 000
El Segundo, Calif.—Standard Oil Co. of Calif		7, 859, 000	18, 000
Toledo, Ohio—Sun Oil Co		7, 361, 000	[2] 15, 000
Los Angeles, Calif.—Southern California Gas Co		12, 189, 000	[3] 30, 000
Styrene Plants—	TOTAL	77, 277, 000	187, 500
Institute, W. Va.—Carbide & Carbon Chemical Co		9, 837, 000	25, 000
Los Angeles, Calif.—Dow Chemical Co		12, 558, 000	25, 000
Velasco, Tex.—Dow Chemical Co		17, 739, 000	50, 000
Koppers, Pa.—Koppers Co., Inc		18, 832, 000	37, 500
Texas City, Tex.—Monsanto Chemical Co		18, 291, 000	50, 000
Chemicals—Furfural			
Memphis, Tenn.—Q. O. Chemical Co		5, 031, 000	12, 000
			Lb./Yr.
Carbon Black			
Odessa, Tex.—United Carbon Co		9, 500, 000	41, 000, 000

[1] Originally built as one plant but subsequently divided into two plants operated by different companies.
[2] Scrambled facility.
[3] Produces feedstock for further processing; scrambled facility.

Present Operating Status of the Plants

Four of the plants listed above, namely, the styrene plant at Institute, W. Va., and the three alcohol butadiene plants, have very recently been shut down. All the other plants are currently in operation. The GR–S plants are operating at about three-quarters of rated capacity. The GR–S plants which previously used alcohol butadiene now use petroleum butadiene.

Location of Plants

As will be seen from table 4, synthetic-rubber facilities have been located in three regions—the Southwest, the East Central, and southern California. The predominant importance of petroleum in the production of synthetic rubber has resulted in the concentration of nearly half the country's total capacity in the gulf area of Texas and Louisiana.

Table 4

Geographic distribution of rated capacity for synthetic rubber, butadiene, and styrene (thousands of long tons)

Region and State	Type of Rubber			Materials		
				Butadiene		
	GR–S	GR–M	GR–I	From Alcohol	From Petroleum	Styrene
EAST CENTRAL:						
Pennsylvania				80		37
Connecticut	30					
Ohio	60					
West Virginia	90			80		25
Kentucky	90	60		60	15	
SUBTOTAL	270	60		220	15	62
SOUTHWEST:						
Louisiana	90		38		70	
Texas	255		30		225	100
SUBTOTAL	345		68		295	100
SOUTHERN CALIFORNIA	90				103	25
TOTAL	705	60	68	220	413	187

Transportation considerations also played a large part in drawing GR–S copolymer plants to the oil-producing areas. Butadiene, produced in plants immediately adjoining large refineries, is a volatile, unstable compound which requires the utmost care in handling and also the use of specially built pressure-type tank cars. The GR–S plants are operated for the Government by manufacturers of tires and other rubber products. Mainly for the reason mentioned above, the plants were located near butadiene plants rather than near the processing plants of their operators.

Part II

PROBLEMS OF POLICY

The Economic Problem

The Test of Competition.—The strictly economic test of the future of synthetic rubber is that of its ability to meet the competition of natural rubber on a cost and quality basis. There is every prospect that within a short span of years the natural-rubber industry could recover and develop to the point where it could again meet the entire new-rubber needs of the American market. If there were no other consideration than that of an economic supply of rubber, it could well be argued that the wartime plants should be left to stand or fall by reason of their ability or inability to meet competition with natural rubber.

The outcome of such free competition is by no means certain. For the special purpose rubbers (neoprene and butyl), for which the Government has erected three plants, the outlook is expected to be good since in various uses they are superior to the natural product. There is substantial difference of opinion concerning the prospects for GR–S or general purpose rubber. There are those who believe that it might retain a considerable place in the market in free competition with natural rubber on a price and quality basis. Others are of the view that little if any of the industry can survive without continued Government support. Were it to be decided that the future of the synthetic-rubber industry should be left wholly to the competitive process, one could not with any assurance forecast what the outcome might be.

Short-Run Requirements for Synthetic Rubber.—In the short run (i. e., until natural rubber is in ample supply), the maintenance of synthetic-rubber output at a substantial level is not likely to present difficulty. According to current estimates the natural-rubber available in the Far East during 1946 may not exceed 600,000 tons, of which perhaps 300,000 tons may be allocated to the United States. In view of prospective requirements by the United States for perhaps 900,000 tons of rubber of all types, the demand for synthetic in 1946 will considerably exceed any minimum likely to be prescribed for national-defense needs. How long this situation will continue depends on the rate at which crude-rubber production expands and the consequent increase in the amount made available to the United States. The turning point, when the ability

of synthetic to face the competition of natural will begin to be tested, may come in the course of 1947, but it may be longer delayed.

Comparative Prices.—The current price of natural rubber in the United States is 22½ cents a pound, as against 18½ cents for GR-S. These prices are comparable since processing costs for synthetic are about 4 cents a pound higher than for natural. During the war the average cost of producing GR–S was substantially above 18½ cents. The high cost was due in large part to the considerable use of butadiene made from alcohol. Alcohol butadiene was much more costly than petroleum butadiene and raised the cost of GR–S accordingly. The use of alcohol butadiene has ceased and the three plants which manufactured it for the Government synthetic program have now been shut down.

Whether a cost situation can be achieved which would retain for synthetic rubber a substantial place in a market fully competitive with natural rubber is problematical. On a competitive basis, synthetic rubber must be priced sufficiently below natural rubber of corresponding quality to offset the higher processing costs. The prices of both synthetic and natural are likely to fall below present levels, but in what amounts cannot be foreseen. Even if the price of natural rubber falls below that of GR–S, the possibility must be recognized that a new type of general-purpose synthetic rubber may be developed which can compete successfully with natural rubber.

Comparative Quality.—In the relatively short period since its establishment, the synthetic-rubber industry has gone far in the production of an excellent substitute for natural rubber. The proportion of use of synthetic to natural has now been increased to around 85 percent synthetic to 15 percent natural. GR–S is used mainly for tire production; for lighter tires, up to nearly 100 percent synthetic is used and the tire produced is very serviceable. For heavy truck tires, however, synthetic rubber is a less satisfactory material, and a much smaller proportion of synthetic can be used. Generally speaking, manufacturers of these tires are eager to increase their use of natural rubber as much as possible and would probably do so if supplies were available, even if it were necessary to pay a price premium.

From the inception of the Government's rubber program, considerable research has been devoted to the improvement of synthetic rubber, and it is highly desirable that research of this nature be continued. Experimentation is still greatly needed along such lines as the effects of varying the proportions of natural and synthetic in tires and other end products. The search for new copolymers may bring fruitful results. Corresponding efforts to improve the quality of natural rubber will, however, be conducted concurrently so that

the eventual outcome with respect to the competitive position of the two cannot be predicted.

Neoprene and butyl occupy a fairly assured competitive position. On account of their special qualities, many manufacturers will prefer them to natural for special uses. In all probability the major portion of the current output will be needed for an indefinite period to meet the domestic demand.

National Defense

The framing of policy with respect to synthetic rubber cannot be based on strictly economic considerations. The experience of the war has made it improbable that the country will ever deprive itself of the services of the synthetic-rubber industry as a safeguard against being cut off from supplies of natural rubber. The questions that present themselves are (1) what part of the industry shall be preserved in both active and stand-by condition capable of use in a future emergency; (2) what part of this total shall be kept in active operation; and (3) by what means shall the market be assured for that part which it is desired to retain in operation?

As commonly made, the proposal to keep available a substantial proportion of GR–S capacity, calls for maintaining only a part in actual operation and holding the rest in stand-by condition. In some quarters, however, the idea of a large amount of unused stand-by is regarded with disfavor on the ground that maintenance costs are large and rapid obsolescence is likely to occur. In this view, little if any stand-by need be provided, but a somewhat larger capacity could be kept in operation with the concomitant advantage of stimulating technical advance in a larger range of plants.

The decision as to the amount of capacity to retain for national-defense purposes depends in part upon the size of the stock pile of natural rubber to be held, since there exists an inverse relationship between the two. The larger the stock pile, the longer the time which can be safely allowed for restoring the capacity to produce synthetic rubber.

Decisions on these points, and the means for giving them effect, do not lie within the discretion or responsibility of the Surplus Property Administration. The making of them is, however, a precedent condition for the formulation of any program for the disposition and use of plants which may be made disposable under them.

Framing of Disposal Policy

Special Prospects for Early Disposal.—With respect to certain plants, there appears to be little reason why they should not be declared surplus and subjected to disposal action at an early date. This is especially the case with the three plants engaged in production of special rubbers (GR–I and GR–M). Their competitive

position is relatively secure and they are therefore not involved in the decisions based upon considerations of national defense. A ready market for them may be anticipated when they are offered for disposal.

There also appears to be no particular reason for delay in making some of the alcohol butadiene capacity available for disposal. Because of the high cost, no provision is likely to be made under normal conditions, for manufacturing rubber from this material. The process is, however, thought by general agreement to be one for which some facilities should be retained in stand-by condition. This could be made a condition of disposal.

In view of their location or characteristics, there are some GR–S plants for which there exists no prospect of being retained in the national defense program. It would be possible to declare these surplus for disposal for other uses than rubber production without prejudice to the planning of the permanent program.

It appears, however, to be the disposition of the owning agency not to make these partial decisions with respect to surplus status, but rather to hold the whole body of decisions in suspense until the national rubber program has been formulated.

Declarations of Surplus.—The Surplus Property Administration agrees with the decision of the Reconstruction Finance Corporation not to declare plants generally surplus until after national rubber policy had taken specific form. Indeed, although the Administration could have prepared a disposal plan, this could not have been completed until it was known what national rubber policy conditions to attach to the disposal terms of various plants. Nor would potential purchasers have had any clear view of market prospects upon which to base their bids.

The Administration is of the opinion, however, that no good purpose would be served by long delaying the making of synthetic-rubber plants available for disposal to private purchasers after the national policy has been framed. Early disposal, while the prospects exist for a good market in the immediate future, appears likely to provide a better return to the Government upon its investment than would disposal at some later date. It would also have the advantage of at once throwing the weight of private research and experimentation behind the improvement of quality and cost-saving processes.

The Administration has given careful study to the problems of disposal which the plants will present. When the outlines of a national rubber program have been developed, we shall be prepared promptly to formulate a disposal plan for plants which are declared surplus, with due regard for whatever conditions are set forth in the national rubber program.

APPENDIX

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Exhibit I

DESCRIPTION OF GR–S PLANTS

1. Identification: Plancor 876.
   Location: Baton Rouge, La.
   Operator: Copolymer Corp., as agent for Rubber Reserve.
   The following companies participate in the ownership and operation of Copolymer Corp.:
   The Armstrong Rubber Co.
   The Dayton Rubber Manufacturing Co.
   The Gates Rubber Co.
   Lake Shore Tire & Rubber Co.
   The Mansfield Tire & Rubber Co.
   The Pennsylvania Rubber Co.
   Sears, Roebuck & Co. (including Armstrong Tire & Rubber Co., in which Sears, Roebuck & Co. owns 50 percent of the voting stock).
   Designed capacity: 30,000 long tons per year.
   Approximate cost: $7,332,000.
   Approximate number of employees: 365.
   Remarks: This plant receives as one of its two principal raw materials, butadiene, by pipe-line connection with an adjacent butadiene plant, and receives the other principal raw material, styrene, by tank-car shipment. Its product is shipped to rubber-fabricating factories throughout the United States. No steam or electric power generating facilities were constructed with the project, these utilities being purchased under contract.

2. Identification: Plancor 127.
   Location: Akron, Ohio.
   Operator: Firestone Tire Rubber Co., as agent for Rubber Reserve.
   Designed capacity: 30,000 long tons per year.
   Approximate cost: $7,766,000.
   Approximate number of employees: 487.
   Remarks: This plant receives its principal raw materials by tank-car shipments, and ships its product to adjacent rubber-fabricating factories. No steam or electric power generating facilities were constructed with the project, these utilities being purchased under contract. A portion of this plant has been modified to permit the segregation and shipment of various types of GR–S in latex form. Other modifications have been made to permit the blending of carbon black and other pigments with GR–S prior to its coagulation, drying, and baling.

3. Identification: Plancor 1056.
   Location: Lake Charles, La.
   Operator: Firestone Tire & Rubber Co., as agent for Rubber Reserve.
   Designed capacity: 60,000 long tons per year.
   Approximate cost: $13,061,000.
   Approximate number of employees: 610.
   Remarks: This plant receives one of its two principal raw materials, butadiene, by pipe-line connection with an adjacent butadiene plant, and receives the other principal raw material, styrene, by tank-car shipment. Its product is shipped to rubber fabricating factories throughout the United States. Steam-generating facilities were constructed with the project, but the electric power is purchased under contract.

4. Identification: Plancor 983–A.
   Location: Port Neches, Tex.
   Operator: Firestone Tire & Rubber Co., as agent for Rubber Reserve.
   Designed capacity: 60,000 long tons per year.
   Approximate cost: $16,046,000.
   Approximate number of employees: 555.
   Remarks: This plant receives one of its two principal raw materials, butadiene, by pipe-line connection with an adjacent butadiene plant, and receives the other principal raw material, styrene, by tank-car shipment. Its product is shipped to rubber-fabricating factories throughout the United States. No steam or electric power generating facilities were constructed with the project, these utilities being purchased under contract.
5. Identification: Plancor 877.
   Location: Baytown, Tex.
   Operator: The General Tire & Rubber Co. (General Latex & Chemical Co., associates), as agent for Rubber Reserve.
   Designed capacity: 30,000 long tons per year.
   Approximate cost: $7,829,000.
   Approximate number of employees: 485.
   Remarks: This plant receives one of its two principal raw materials, butadiene, by pipe-line connection with an adjacent butadiene plant, and receives the other principal raw material, styrene, by tank-car shipment. Its product is shipped to rubber-fabricating factories throughout the United States. Steam-generating facilities were constructed with the project, but electric power is purchased under contract. A portion of this plant has been modified to permit the blending of carbon black and other pigments with GR–S prior to its coagulation, drying, and baling.
6. Identification: Plancor 982.
   Location: Borger, Tex.
   Operator: B. F. Goodrich Co., a division of the B. F. Goodrich Rubber Co., as agent for Rubber Reserve.
   Designed capacity: 45,000 long tons per year.
   Approximate cost: $8,842,000.
   Approximate number of employees: 501.
   Remarks: This plant receives one of its two principal raw materials, butadiene, by pipe-line connection with an adjacent butadiene plant, and receives the other principal raw material, styrene, by tank-car shipment. Its product is shipped to rubber-fabricating factories throughout the United States. No steam or electric power generating facilities were constructed with the project, these utilities being purchased under contract.
7. Identification: Plancor 128.
   Location: Louisville, Ky.
   Operator: B. F. Goodrich Chemical Co., a division of the B. F. Goodrich Co., as agent for Rubber Reserve.
   Designed capacity: 60,000 long tons per year.
   Approximate cost: $11,120,000.
   Approximate number of employees: 665.
   Remarks: This plant receives one of its two principal raw materials, butadiene, by pipe-line connection with an adjacent butadiene plant, and by tank car. Styrene, the other principal raw material, is received by tank-car shipment. Its product is shipped to rubber-fabricating factories in the general area of the plant. Steam-generating facilities were constructed with the project and electric power is purchased. A portion of this plant has been modified to permit the segregation and shipment of various types of GR–S in latex form. One unit of this plant, with an annual capacity for producing 22,500 tons of GR–S has been modified to enable it to be used for the production of another type of synthetic rubber known as GR–A (a butadiene-acrylonitrile type), at an annual rate of 15,000 tons. The modified unit was operated on GR–A production for a short time to demonstrate its suitability for this type of operation, but has since continued to be operated as a GR–S producer.
8. Identification: Plancor 983.
   Location: Port Neches, Tex.
   Operator: B. F. Goodrich Chemical Co., a division of the B. F. Goodrich Co., as agent for Rubber Reserve.
   Designed capacity: 60,000 long tons per year.
   Approximate cost: $16,047,000.
   Approximate number of employees: 634.
   Remarks: This plant receives one of its principal raw materials, butadiene, by pipe-line connection with an adjacent butadiene plant, and receives the other principal raw material, styrene, by tank-car shipment. Its product is shipped to rubber-fabricating factories throughout the United States. Steam-generating facilities were constructed with the project, but electric power is purchased under contract.
9. Identification: Plancor 126.
   Location: Akron, Ohio.
   Operator: Goodyear Synthetic Rubber Corp., a wholly owned subsidiary of the Goodyear Tire & Rubber Co., as agent for Rubber Reserve.
   Designed capacity: 30,000 long tons per year.
   Approximate cost: $7,548,000.
   Approximate number of employees: 406.
   Remarks: This plant receives its principal raw materials by tank-car shipment, and ships its product to adjacent rubber-fabricating factories. No steam or electric power generating facilities were constructed with the project, these utilities being purchased under contract.
10. Identification: Plancor 956.
    Location: Houston, Tex.
    Operator: Goodyear Synthetic Rubber Corp., a wholly owned subsidiary of the Goodyear Tire & Rubber Co., as agent for Rubber Reserve.
    Designed capacity: 60,000 long tons per year.
    Approximate cost: $13,415,000.
    Approximate number of employees: 680.
    Remarks: This plant receives one of its two principal raw materials, butadiene, by pipe-line connection with an adjacent butadiene plant, and receives the other principal raw material, styrene, by tank-car shipment. Its product is shipped to rubber-fabricating factories throughout the United States. No steam or electric power generating facilities were constructed with the project, these utilities being purchased under contract.
11. Identification: Plancor 611.
    Location: Los Angeles, Calif.
    Operator: Goodyear Synthetic Rubber Corp., a wholly owned subsidiary of the Goodyear Tire & Rubber Co., as agent for Rubber Reserve.
    Designed capacity: 60,000 long tons per year.
    Approximate cost: $10,000,000.

Approximate number of employees: 322.
Remarks: This plant receives its two principal raw materials by pipe-line connection with adjacent butadiene and styrene plants, and ships its product to rubber-fabricating factories in the West. No steam or electric power generating facilities were constructed with the project, these utilities being purchased under contract.

12. Identification: Plancor 1278.
Location: Louisville, Ky.
Operator: National Synthetic Rubber Corp., as agent for Rubber Reserve.
The following companies participate in the ownership and operation of the National Synthetic Rubber Corp.:
Goodall Rubber Co.,
Hamilton Rubber Manufacturing Co.,
Hewitt Rubber Co.,
Lee Rubber & Tire Co.,
Minnesota Mining & Manufacturing Co. (including Inland Rubber Corp., a subsidiary).
Designed capacity: 30,000 long tons per year.
Approximate cost: $6,865,000.
Approximate number of employees: 395.
Remarks: This plant receives one of its two principal raw materials, butadiene, by pipe-line connection with an adjacent butadiene plant, and by tank cars and receives the other principal raw material, styrene, by tank-car shipment. Its product is shipped to rubber-fabricating factories in the northeastern area. No steam or electric power generating facilities were constructed with the project, these utilities being purchased.

13. Identification: Plancor 980.
Location: Institute, W. Va.
Operator: United States Rubber Co., as agent for Rubber Reserve.
Designed capacity: 90,000 long tons per year.
Approximate cost: $18,398,000.
Approximate number of employees: 980.
Remarks: This plant receives all of its principal raw materials by pipe-line connections with adjacent butadiene and styrene plants, and ships its product to rubber-fabricating factories in the northeastern area. No steam or electric power generating facilities were constructed with the project, these utilities being purchased.

14. Identification: Plancor 611.
Location: Los Angeles, Calif.
Operator: United States Rubber Co., as agent for Rubber Reserve.
Designed capacity: 30,000 long tons per year.
Approximate cost: $5,080,000.
Approximate number of employees: 304.
Remarks: This plant receives its principal raw materials by pipe-line connections with adjacent butadiene and styrene plants, and ships its product to rubber-fabricating factories in the West. No steam or electric power generating facilities were constructed with the project, these utilities being purchased under contract. A portion of this plant has been modified to permit the segregation and shipment of various types of GR–S in latex form.

15. Identification: Plancor 129.
Location: Naugatuck, Conn.
Operator: United States Rubber Co., as agent for Rubber Reserve.

Designed capacity: 30,000 long tons per year.
Approximate cost: $8,357,000.
Approximate number of employees: 339.
Remarks: This plant receives its principal raw materials by tank-car shipment, and ships its product to adjacent rubber-fabricating factories. A portion of this plant has been modified to permit the segregation and shipment of various types of GR–S in latex form. No steam or electric power generating facilities were constructed as an integral part of this project, these utilities being purchased. However, one additional steam boiler was installed by the Government at the adjacent privately owned plant of the United States Rubber Co., which operates this boiler in conjunction with boilers of their own to provide steam capacity for both facilities.

Exhibit II

DESCRIPTION OF THE ALCOHOL BUTADIENE PLANTS

1. Identification: Plancor 229.
Location: Institute, W. Va.
Operator: Carbide & Carbon Chemicals Corp., as agent for Rubber Reserve.
Designed capacity: 80,000 short tons per year.
Approximate cost: $38,486,000.
Approximate number of employees: 611.
Remarks: This plant receives its principal raw material, alcohol, by barge, and tank-car shipments, and ships its product to an adjacent copolymer plant by pipe line. The process which is used to convert alcohol to butadiene is one which was developed by the Carbide & Carbon Chemicals Corp. Carbide & Carbon also operates a styrene plant at this same location, and many of the plant facilities are used in common by the two projects. Steam-generating facilities were constructed with the project, and supply the entire needs of the butadiene plant, the styrene plant, and the adjacent copolymer plant operated by the United States Rubber Co. Electric power is purchased.

2. Identification: Plancor 1207.
Location: Louisville, Ky.
Operator: Carbide & Carbon Chemicals Corp., as agent for Rubber Reserve.
Designed capacity: 60,000 short tons per year.
Approximate cost: $34,952,000.
Approximate number of employees: 566.
Remarks: This plant receives its principal raw material, alcohol, by barge, tank truck, and tank-car shipments, and ships its product to an adjacent copolymer plant by pipe line. The process which is used to convert alcohol to butadiene is one which was developed by the Carbide & Carbon Chemicals Corp. Steam-generating facilities were constructed with the project and supply the entire needs of the adjacent copolymer plant operated by the National Synthetic Rubber Corp. Electric power is purchased.

3. Identification: Plancor 483.
Location: Kobuta, Pa.
Operator: Koppers Co., Inc., as agent for Rubber Reserve.
Designed capacity: 80,000 short tons per year.
Approximate cost: $42,000,000.
Approximate number of employees: 757.

Remarks: This plant receives its principal raw material, alcohol, by tank-car shipments, and ships its product to copolymer plants in the northeast area by tank-car shipments. The process which is used to convert alcohol to butadiene is one which was developed by the Carbide & Carbon Chemicals Corp. The operator also operates a styrene plant at this same location, and many of the plant facilities are used in common by the two projects. Steam-generating facilities were constructed with the project, and supply the needs of the butadiene plant and also the styrene plant. Electric power generating facilities were constructed of sufficient size to meet the requirements of the butadiene and styrene plants, and to generate additional power to assist the public utilities system in serving war time requirements of the area.

Exhibit III

DESCRIPTION OF THE PETROLEUM BUTADIENE PLANTS

1. Identification: Plancor 706 (part).
   Location: Lake Charles, La.
   Operator: Cities Service Refining Corp., for the account of Rubber Reserve.
   Designed capacity: 55,000 short tons per year.
   Approximate cost: $17,029,000.
   Approximate number of employees: 433.
   Remarks: This plant receives its feedstock, normal butylene, in the form of a mixed stream of hydrocarbons by pipe line from an adjacent refinery operated by Cities Service Refining Corp. The normal butylene is catalytically dehydrogenated to butadiene and purified by the copper ammonium acetate process. The product is transferred by pipe line to the adjacent copolymer plant operated by the Firestone Tire & Rubber Co. Steam-generating facilities were constructed with the project and electric power is purchased.
2. Identification: Plancor 485.
   Location: Baytown, Tex.
   Operator: Humble Oil & Refining Co., for the account of Rubber Reserve.
   Designed capacity: 30,000 short tons per year.
   Approximate cost: $18,790,000.
   Approximate number of employees: 401.
   Remarks: This plant receives its feedstock, normal butylene, in the form of a mixed stream of hydrocarbons by pipe line from an adjacent refinery operated by Humble Oil & Refining Co. The normal butylene is catalytically dehydrogenated to butadiene and purified by the copper ammonium acetate process. The product is transferred by pipe line to the adjacent copolymer plant operated by the General Tire & Rubber Co. Steam and electric power generating facilities were constructed with the project.
3. Identification: Plancor 933.
   Location: Port Neches, Tex.
   Operator: Neches Butane Products Co., for the account of Rubber Reserve.
   The following companies participate in the ownership and operation of Neches Butane Products Co., on a nonprofit basis:
   Atlantic Refining Co.
   Gulf Oil Co.
   Pure Oil Co.
   Socony-Vacuum Oil Co.
   The Texas Co.

   Designed capacity: 100,000 short tons per year.
   Approximate cost: $56,693,000.
   Approximate number of employees: 1,053.
   Remarks: This plant receives its feedstock, normal butylene, in the form of a mixed stream of hydrocarbons by pipe line from adjacent refineries operated by the five oil companies participating in the operation of the project. The normal butylene is catalytically dehydrogenated to butadiene and purified by the furfural process. The product is transferred by pipe line to the adjacent copolymer plants operated by the Firestone Tire & Rubber Co. and B. F. Goodrich Chemical Co. Steam-generating facilities were constructed with the project and electric power is purchased.
4. Identification: Plancor 963.
   Location: Los Angeles, Calif.
   Operator: Shell Chemical Division of Shell Union Oil Corp., as agent for Rubber Reserve.
   Designed capacity: 55,000 short tons per year.
   Approximate cost: $19,917,000.
   Approximate number of employees: 498.
   Remarks: This plant was designed and is operated to utilize as feedstock a crude butadiene stream produced by a nearby Government-owned plant operated by Southern California Gas Co. Butadiene purification facilities were designed for the production of 55,000 short tons annually, 30,000 of which are extracted from the crude stream. The remaining 25,000 short tons are produced by catalytic dehydrogenation of the normal butylene which is also contained in the Southern California Gas Co. crude butadiene stream. The purification unit makes use of the copper ammonium acetate process. The butadiene product is disposed of by pipe line to the adjacent copolymer plants operated by Goodyear Synthetic Rubber Corp. and United States Rubber Co. Steam-generating facilities were constructed with the project and electric power is purchased.
5. Identification: Plancor 1063.
   Location: Houston, Tex.
   Operator: Sinclair Rubber, Inc. (a wholly owned subsidiary of Sinclair Refining Co.), for the account of Rubber Reserve.
   Designed capacity: 50,000 short tons per year.
   Approximate cost: $30,889,000.
   Approximate number of employees: 737.
   Remarks: This plant receives its feedstock, normal butylene, in the form of a mixed stream of hydrocarbons by pipe line from various oil refineries in the Houston area. The normal butylene is catalytically dehydrogenated to butadiene and purified by the furfural process. The product is transferred by pipe line to the adjacent copolymer plant operated by Goodyear Synthetic Rubber Corp. Steam and electric power generating facilities were constructed with the project. Electric-power generating facilities were constructed of sufficient size to meet the requirements of the butadiene plant and the adjacent copolymer plant, and to generate additional power to assist the public-utilities system in serving war time requirements of the area.
6. Identification: Plancor 152.
   Location: Baton Rouge, La.
   Operator: Standard Oil Co. of New Jersey, Louisiana Division, for the account of Rubber Reserve.
   Designed capacity: 15,000 short tons per year.

Approximate cost: $8,762,000.
Approximate number of employees: 156.
Remarks: This plant receives its feedstock, normal butylene, in the form of a mixed stream of hydrocarbons by pipe line from an adjacent refinery operated by Standard Oil Co. of New Jersey. The normal butylene is catalytically dehydrogenated to butadiene and purified by the copper ammonium acetate process. This product is transferred by pipe line to the adjacent copolymer plant operated by the Copolymer Corp. Steam-generating facilities were constructed with the project and electric power is purchased.

7. Identification: Plancor 484.
Location: Borger, Tex.
Operator: Phillips Petroleum Co., for the account of Rubber Reserve.
Designed capacity: 45,000 short tons per year.
Approximate cost: $35,682,000.
Approximate number of employees: 823.
Remarks: This plant produces butadiene from butane, using the Phillips 4-step process whereby butane is catalytically dehydrogenated to butylene, and the butylene is in turn catalytically dehydrogenated to butadiene, which is purified by the furfural process. The raw material, butane, is obtained from the gas and oil fields in the area. The butadiene product is shipped by pipe line to the adjacent copolymer plant operated by the B. F. Goodrich Chemical Co. Steam and electric power-generating facilities were constructed with the project.

8. Identification: Plancor 1593.
Location: El Segundo, Calif.
Operator: Standard Oil Co. of California, as agent for Rubber Reserve.
Designed capacity: 18,000 short tons per year.
Approximate cost: $7,859,000.
Approximate number of employees: 129.
Remarks: This plant produces butadiene from butane feedstock by the Houdry process, and the butadiene is purified in a vapor phase copper ammonium acetate unit. Feedstock is received by pipe line from an adjacent refinery operated by the Standard Oil Co. of California, and the product is shipped to the two copolymer plants in the Los Angeles area by tank truck. Steam-generating facilities were constructed with the project, but the output must be supplemented by steam purchased from the refinery. Electric power is purchased.

9. Identification: Plancor 1365.
Location: Toledo, Ohio.
Operator: Sun Oil Co., for the account of Rubber Reserve.
Designed capacity: 15,000 short tons per year.
Approximate cost: $7,361,000.
Approximate number of employees: 258.
Remarks: This plant produces butadiene from butane feedstock by the Houdry process, and the butadiene is purified in a vapor phase copper ammonium acetate unit. Feedstock is received by pipe line from an adjacent refinery operated by the Sun Oil Co., and the product is shipped to copolymer plants in the northeastern area by tank car. Steam-generating facilities were constructed with the project, and electric power is purchased.

10. Identification: Plancor 1518.
Location: Ingleside, Tex.
Operator: Humble Oil & Refining Co., for the account of Rubber Reserve.

Designed capacity: 12,500 short tons per year.
Approximate cost: $4,204,000.
Approximate number of employees: 429.
Remarks: The plant facilities consist of Government-owned and privately owned equipment. Government-owned equipment includes a vapor phase copper ammonium acetate extraction plant, pressure storage, a charge gas compressor station, light ends absorption and fractionating plant, cracked naphtha clay-treating plant and one boiler. Privately owned equipment, converted to butadiene operations, includes two cracking furnaces, feed preheater furnaces, preliminary fractionator and attendant equipment, benzene rerun tower, heavy oil tankage and minor items of distillation equipment. The privately owned equipment is valued at $2,650,611. Supplemental steam requirements and electric power are purchased under contract. The principal raw material, naphtha, is obtained by pipe line, or by tank car. The naphtha is thermally cracked to butadiene by the steam-cracking process, and large quantities of mixed butylenes, aromatic naphthas, and other valuable petroleum byproducts are produced. The cracking facilities are designed to produce 7,000 tons of butadiene annually. The butadiene is purified in a vapor phase copper ammonium acetate unit which has a designed capacity of 12,500 short tons per year, such design contemplating the purification of crude material produced by a nearby Government plant operated by the Taylor Refining Co. The butadiene produced is disposed of by tank-car shipments to copolymer plants in the Gulf Coast area.

11. Identification: Plancor 1530.
Location: El Dorado, Ark.
Operator: Lion Oil Co., for the account of Rubber Reserve.
Designed capacity: 3,500 short tons per year.
Approximate cost: $1,597,000.
Approximate number of employees: 71.
Remarks: The plant does not produce a finished specification butadiene because no purification unit was built as part of this project. The crude butadiene produced is shipped by tank car to other Government butadiene plants in the Gulf Coast area, where excess purification capacity exists. Butadiene is produced by thermally cracking petroleum naphtha, utilizing the True Vapor Phase Process. Large quantities of mixed butylenes, aromatic naphthas, and other valuable petroleum byproducts are produced. Although the equipment which composes the butadiene plant is Government-owned, other equipment used in conjunction with the butadiene plant, primarily for the purpose of supplying naphtha feedstock, is owned by the Lion Oil Co., the investment in such auxiliary facilities amounting to $210,000. Steam-generating facilities were installed as a part of this project, and electric power is purchased.

12. Identification: Plancor 1167.
Location: Los Angeles, Calif.
Operator: Southern California Gas Co., as agent for Rubber Reserve.
Designed capacity: 30,000 short tons per year.
Approximate cost: $12,189,000.
Approximate number of employees: 709.
Remarks: This plant consists of combined Government-owned and privately owned equipment. Government-owned equipment includes certain boilers, second-stage compressors, absorption plant, dehydration plant, high-pressure tankage, and certain cooling towers. Privately owned equipment, converted to butadiene operations, includes genera-

tors, certain steam boilers and blowers, first-stage compressors, purifiers, low-pressure tankage, and certain cooling towers. The privately owned equipment is valued at $5,034,200. Electric power is purchased. The principal raw material, naphtha, is obtained from nearby petroleum refineries by pipe line. The naphtha is converted to butadiene by thermally cracking in the presence of steam in regenerative furnaces. Large quantities of mixed butylenes, aromatic naphthas, and other valuable petroleum byproducts are produced. No butadiene purification unit was built as a part of this project and, consequently, the product is a crude butadiene which is shipped by pipe line to the nearby Government plant (operated by Shell Oil Co.) for purification to specification product.

13. Identification: Plancor 1355.
Location: Baton Rouge, La.
Operator: Standard Oil Co. of New Jersey, Louisiana Division, for the account of Rubber Reserve.
Designed capacity: 10,300 short tons per year.
Approximate cost: $1,833,000.
Approximate number of employees: 166.
Remarks: This plant consists of combined Government-owned and privately owned equipment. Government-owned equipment includes a charge gas-compressor house, one large pressure sphere, and miscellaneous drums. Privately owned equipment, converted to butadiene operations, includes four cracking furnaces, a low-pressure fractionator, a gas-absorption tower, fractionators, and attendant equipment. The production plant, composed of the above equipment, has a rated capacity of 6,860 short tons annually, and produces butadiene from petroleum by thermally cracking the naphtha in the presence of steam. Large quantities of mixed butylenes, aromatic naphthas, and other valuable petroleum byproducts are produced. The butadiene is purified in a vapor phase copper ammonium acetate unit, having a capacity of approximately 10,300 short tons per year; the refrigeration plant and the compressor building being the property of the Government, and the other major items of equipment being privately owned. The privately owned equipment at this plant is valued at $1,531,260. Petroleum naphtha is obtained from the adjacent petroleum refinery, operated by the Standard Oil Co. of New Jersey. The butadiene produced is disposed of by pipe line to the adjacent copolymer plant operated by Copolymer Corp. No steam or electric power generating facilities were installed with this project, both being purchased.

14. Identification: Plancor 1571.
Location: Corpus Christi, Tex.
Operator: Taylor Refining Co., for the account of Rubber Reserve.
Designed capacity: 2,600 short tons per year.
Approximate cost: $1,841,000.
Approximate number of employees: 75.
Remarks: This plant does not produce a finished specification butadiene because no purification unit was built as part of the project. The crude butadiene product is shipped by tank car to other Government butadiene plants in the Gulf Coast area, where excess purification capacity exists. Butadiene is produced by thermally cracking petroleum naphtha, utilizing the True Vapor Phase Process. Large quantities of mixed butylenes, aromatic naphthas, and other valuable petroleum byproducts are produced. The plant equipment consists of combined Government-owned

and privately owned equipment. Government-owned equipment includes everything with the exception of a cooling tower and a naphtha preheating furnace. The privately owned equipment is valued at $381,720. No steam or electric power generating facilities were installed with this project, both being purchased. Petroleum naphtha feed is obtained from the adjacent refinery operated by the Taylor Refining Co.

Exhibit IV

DESCRIPTION OF THE STYRENE PLANTS

1. Identification: Plancor 1055.
Location: Institute, W. Va.
Operator: Carbide & Carbon Chemicals Corp., as agent for Rubber Reserve.
Designed capacity: 25,000 short tons per year.
Approximate cost: $9,837,000.
Approximate number of employees: 289.
Remarks: In addition to the styrene facilities, Carbide & Carbon operates an alcohol butadiene plant at this same location, and many of the plant facilities are used in common by the two projects. Ethylene and benzene are the principal raw materials used in the manufacture of styrene, and they are converted to styrene by a process developed by the Carbide & Carbon Chemicals Corp. Ethylene is a gas which is either purchased for pipe-line transfer from a nearby private plant owned by the Carbide & Carbon Chemicals Corp., or is extracted from byproduct fuel gases produced in the butadiene operations. Benzene is purchased from suppliers in the Northeast and transferred to the plant by barge or tank car. The styrene product is shipped to the adjacent copolymer plant, operated by the United States Rubber Co., by pipe line. The steam-generating facilities which were constructed with the project supply the entire needs of the butadiene plant, the styrene plant, and the adjacent copolymer plant. Electric power is purchased.

2. Identification: Plancor 929.
Location: Los Angeles, Calif.
Operator: The Dow Chemical Co., as agent for Rubber Reserve.
Designed capacity: 25,000 short tons per year.
Approximate cost: $12,558,000.
Approximate number of employees: 356.
Remarks: This produces styrene from ethylene and benzene by a process developed by the Dow Chemical Co. Equipment has been provided for the production of ethylene from ethyl alcohol or ethyl ether, and equipment has also been provided for the extraction of ethylene from byproduct fuel gases obtained from the butadiene operations carried out by the Southern California Gas Co. as agent for Rubber Reserve. A portion of the plant has been converted to permit the extraction of benzene from a benzene-rich aromatic naphtha stream, also produced as a byproduct of the aforesaid butadiene operations. The styrene product is shipped by pipe line to the adjacent West Coast copolymer plants. Steam-generating facilities have been built as a part of the project, but electric power is purchased.

3. Identification: Plancor 930.
Location: Velasco, Tex.

Operator: The Dow Chemical Co., as agent for Rubber Reserve.
Designed capacity: 50,000 short tons per year.
Approximate cost: $17,759,000.
Approximate number of employees: 394.

Remarks: This plant utilizes ethylene and benzene as principal raw materials in the manufacture of styrene. A process developed by the Dow Chemical Co. is used for the conversion. Ethylene is purchased from the Texas City plant owned by the Carbide & Carbon Chemicals Corp., and benzene is received by barge, tank-car shipments, or is purified from crude benzol produced in nearby petroleum refineries. The product is disposed of to copolymer plants in the Gulf Coast area by tank-car shipments. No steam or electric power generating facilities were constructed with this project, these utilities being purchased.

4 Identification: Plancor 483.
Location: Kobuta, Pa.
Operator: Koppers Co., Inc., as agent for Rubber Reserve.
Designed capacity: 37,500 short tons per year.
Approximate cost: $18,832,000.
Approximate number of employees: 431.

Remarks: The operator of these styrene facilities also operates an alcohol butadiene plant at this same location, and many of the plant facilities are used in common by the two projects. Ethylene and benzene are the principal raw materials used in the manufacture of styrene, and they are converted to styrene by a process developed primarily by the Dow Chemical Co. Equipment has been installed to permit the production of ethylene from industrial alcohol or from ethyl ether, and equipment is also available to permit extraction of ethylene from byproduct fuel gases produced in the butadiene operations. Benzene is produced by this plant from motor-fuel grade benzol purchased in the northeast area. Facilities have been installed at this location for the purification of recycle styrene of low purity returned by all of the copolymer plants in the northeast area by tank car. Steam-generating facilities which have been constructed as a part of the project, supply the requirements of both the styrene plant and the butadiene plant. Electric power generating facilities have also been constructed of sufficient size to meet the requirements of the styrene and the butadiene plants, with additional generating capacity over and beyond this which was installed to assist the local public-utilities system in meeting wartime power requirements.

5 Identification: Plancor 214.
Location: Texas City, Tex.
Operator: Monsanto Chemical Co., as agent for Rubber Reserve.
Designed capacity: 50,000 short tons per year.
Approximate cost: $18,291,000.
Approximate number of employees: 579.

Remarks: At this plant, the principal raw materials, ethylene and benzene, are converted to styrene by a process developed principally by the Dow Chemical Co. The ethylene requirements are produced by thermally cracking propane. Benzene is shipped to the plant by barge and tank car. The styrene product is shipped to copolymer plants in the Gulf Coast area by tank car. Steam and electric power generating facilities have been constructed as a part of the project.

Exhibit V

DESCRIPTION OF FURFURAL AND CARBON BLACK PLANTS

1. Identification: Plancor 1233.
Location: Memphis, Tenn.
Operator: Q. O. Chemical Co.
Designed capacity: 12,000 short tons per year.
Approximate cost: $5,031,000.
Approximate number of employees: 126.

Remarks: This plant occupies a tract of about 48 acres of land and comprises buildings, storage tanks, and other equipment designed to manufacture furfural. This solvent is required in large quantities for the production of butadiene, and this plant was required to supplement existing sources of supply. The process involves treating corncobs, oat-, rice-, and cottonseed hulls with weak acid and steam-distilling the resultant mass. Furfural is used in oil refining and existing demand aside from the synthetic-rubber program, is about 6,000 tons a year. The market for this material is expected to expand materially with postwar technical developments. Quaker Oats Co. was the sole commercial producer before the war and is the owner of Q. O. Chemical Co.

2. Identification: Plancor 2279.
Location: Odessa, Tex.
Operator: United Carbon Co., Inc. (Md.).
Rated capacity: 41,000 pounds per year carbon black.
Approximate cost: $9,500,000.
Approximate number of employees: 80.

Remarks: This plant is designed to produce channel-type carbon black from natural gas supplied from several gasoline absorption plants located in this area. Operating at capacity it would require about 80 million cubic feet of gas per day. The equipment consists of four treater plants whose function is to desulphurize the incoming gas. This gas then goes to 536 burner houses, which are located in three units or groups. The usual equipment is provided for handling the resultant carbon black. Housing facilities built as a part of the project consist of 88 dwellings. Water and steam are provided from project sources, electric power is purchased. The plant is served by a siding connecting with the Texas and Pacific Railway.

EXHIBIT VI

PRODUCTION OF GR-S BY GOVERNMENT-OWNED COPOLYMER PLANTS

Operator	Location	Designed Capacity	1942	1943	1944	6 Months 1945
Copolymer Corp.	Baton Rouge, La.	30,000	----------	19,741	38,090	18,523
Firestone Tire & Rubber Co.	Akron, Ohio	30,060	944	24,196	39,385	19,095
Firestone Tire & Rubber Co.	Lake Charles, La.	60,000	----------	5,466	46,326	37,126
Firestone Tire & Rubber Co.	Port Neches, Tex.	60,000	----------	668	50,596	37,934
General Tire & Rubber Co.	Baytown, Tex.	30,000	----------	8,367	37,124	18,291
B. F. Goodrich Chem. Co.	Borger, Tex.	45,000	----------	6,735	39,633	27,200
B. F. Goodrich Chem. Co.	Louisville, Ky.	60,000	102	29,655	47,952	34,734
Goodyear Syn. Rubber Corp.	Akron, Ohio	30,000	868	17,040	37,158	17,016
Goodyear Syn. Rubber Corp.	Houston, Tex.	60,000	----------	1,581	45,569	35,148
Goodyear Syn. Rubber Corp.	Los Angeles, Calif.	60,000	----------	7,047	29,305	16,737
National Syn. Rubber Corp.	Louisville, Ky.	30,000	----------	5,428	35,512	18,301
U. S. Rubber Company	Institute, W. Va.	90,000	----------	36,816	112,948	57,122
U. S. Rubber Company	Los Angeles, Calif.	30,000	----------	1,303	21,399	16,812
U. S. Rubber Company	Naugatuck, Conn.	30,000	327	11,720	27,598	17,570
		705,000	2,241	181,470	668,840	409,473

Exhibit VII

PRODUCTION OF PETROLEUM BUTADIENE BY GOVERNMENT-OWNED PLANTS

Operator	Location	Designed Capacity (Short tons)	1943	1944	6 Months 1945
BUTYLENE FEEDSTOCK:					
Cities Service Co.	Lake Charles, La.	55,000	----------	6,596	9,753
Humble Oil & Refining Co.	Baytown, Tex.	30,000	6,208	29,495	19,495
Neches Butane Products Co.	Port Neches, Tex.	100,000	----------	48,338	47,578
Shell Union Oil Corp.	Los Angeles, Calif.	55,000	1,675	30,919	22,108
Sinclair Rubber, Inc.	Houston, Tex.	50,000	----------	19,173	20,143
Standard Oil Co. of N. J.	Baton Rouge, La.	15,000	11,544	17,799	7,921
Total butadiene produced from butylene feedstock		305,000	19,427	152,320	126,968
BUTANE FEEDSTOCK:					
Phillips Petroleum Co.	Borger, Tex.	45,000	3,930	23,263	14,773
Standard Oil Co. of Calif.	El Segundo, Calif.	18,000	----------	3,975	3,936
Sun Oil Co.	Toledo, Ohio	15,000	----------	2,479	3,698
Total butadiene produced from butane feedstock		78,000	3,930	29,717	22,407
NAPHTHA FEEDSTOCK:					
Humble Oil & Refining Co.	Ingleside, Tex.	12,500	964	6,839	5,513
Standard Oil Co. of N. J.	Baton Rouge, La.	10,300	3,429	6,998	3,834
Total butadiene produced from naphtha feedstock		22,800	4,393	13,837	9,347
Total production of petroleum butadiene		----------	27,750	195,874	158,722

Exhibit VIII

PRODUCTION OF ALCOHOL BUTADIENE BY GOVERNMENT-OWNED PLANTS

Operator	Location	Designed Capacity (Short tons)	1943	1944	6 Months 1945
ALCOHOL FEEDSTOCK:					
Carbide & Carbon Chem. Corp	Institute, W. Va	80,000	77,465	140,960	64,802
Carbide & Carbon Chem. Corp	Louisville, Ky	60,000	25,530	94,053	46,539
Koppers Company, Inc	Kobuta, Pa	80,000	26,690	126,691	63,110
Total butadiene produced from alcohol feedstock		220,000	129,685	361,734	174,451

Exhibit IX

PRODUCTION OF STYRENE BY GOVERNMENT-OWNED PLANTS

Operator	Location	Designed Capacity (Short tons)	1943	1944	6 Months 1945
Carbide & Carbon Chem. Corp	Institute, W. Va	25,000	5,907	19,060	9,714
Dow Chemical Co	Los Angeles, Calif	25,000	10,818	13,110	8,764
Dow Chemical Co	Velasco, Tex	50,000	9,089	48,098	34,058
Koppers Company, Inc	Kobuta, Pa	37,500	5,835	32,039	20,096
Monsanto Chemical Co	Texas City, Tex	50,000	15,532	47,636	30,249
Total		187,500	47,181	159,943	102,881

Exhibit X

RUBBER—WORLD PRODUCTION AND UNITED STATES ABSORPTION IN SELECTED PREWAR YEARS, 1910 TO 1940

(In thousands of long tons)

Year	World Production						Absorption in the United States				Percent of Total Absorbed In United States
	Crude Rubber			Synthetic	Reclaimed (Rubber content) [1] [2]	Total, All Kinds	Imported Crude	Reclaimed (Rubber content) [1]	Synthetic	Total	
	Far East	Other	Total								
1910	11	83	94			94	39			39	41.6
1920	305	37	342		23	365	215	23		238	65.2
1930	806	21	827		87	914	376	85		461	50.4
1935	855	19	874	[3] 10	65	949	492	65		557	58.7
1940	1,350	42	1,392	[3] 115	115	1,622	[4] 648	103	.3	754	46.5

[1] Based on estimated rubber content of 55 percent of gross weight. Reclaimed rubber contains, in addition to rubber, large amounts of carbon black, fillers, and chemicals.
[2] United States production only. Production in the United Kingdom and Europe was probably less than 10,000 tons in 1935 but has increased substantially during the war.
[3] Estimated. In 1935, production was principally in the Soviet Union; in 1940 production was principally in the Soviet Union and Germany.
[4] Net United States imports of crude in 1940 were 811,000 tons, part of which was stock piled.

Source.—United States Tariff Commission—"War Changes in Industry Series Report No. 6".

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